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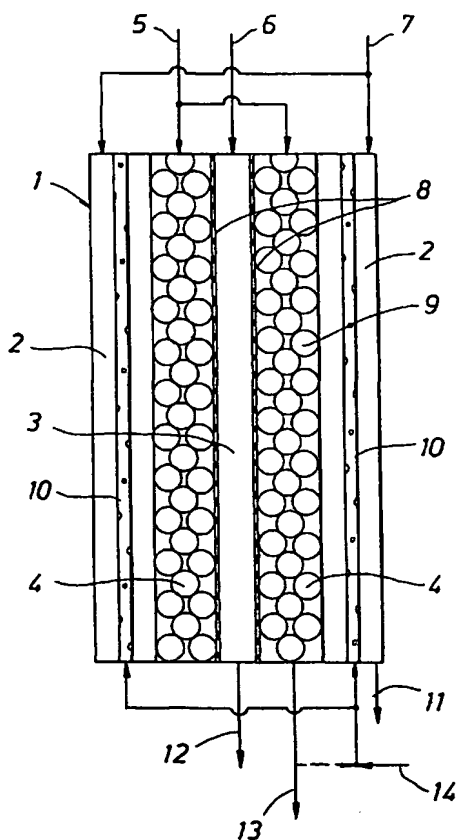
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(54) Title: APPARATUS AND PROCESS FOR PRODUCTION OF HIGH PURITY HYDROGEN



(57) Abstract: The invention relates to a new and improved process and apparatus for the production of high purity hydrogen by steam reforming. The apparatus is an integrated flameless distributed combustion-membrane steam reforming (FDC-MSR) or reactor for steam reforming of a vaporizable hydrocarbon to produce  $H_2$  and  $CO_2$ , with minimal  $CO$ , and minimal  $CO$  in the  $H_2$  stream. The flameless distributed combustion drives the steam reforming reaction which provides great improvements in heat exchange efficiency and load following capabilities. The reactor may contain multiple flameless distributed combustion chambers and multiple hydrogen-selective, hydrogen-permeable, membrane tubes. The feed and reaction gases may flow through the reactor either radially or axially. A further embodiment of the invention involves producing high purity hydrogen by dehydrogenation using an integrated FDC-membrane de-hydrogenation reactor. A still further embodiment of the invention involves a zero emission hybrid power system wherein the produced hydrogen is used to power a high-pressure internally manifolded molten carbonate fuel cell. In addition, the design of the FDC-SMR powered fuel cell makes it possible to capture good concentrations of  $CO_2$  for sequestration or use in other processes.



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